Annual Environmental and Reclamation Report 2003

Prepared for:

Mount Polley Mining Corporation

For Submission to:

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and

Ministry of Water, Land and Air Protection

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Table of Contents

Tables

Surface Water Quality

Groundwater Quality

Disturbed Areas

Figures

Maps

Surface Water Quality

Groundwater Quality

Climatology

Hydrology and Hydrogeology

Photo Plates

Appendices

1.0 INTRODUCTION

Imperial Metals Corporation is 100% owner/operator of the Mount Polley Mine, an open pit copper-gold mine, located approximately 60 km northeast of Williams Lake, B.C. (Figure 1). Access to the mine site from 150 Mile House is north along secondary highway No. 115 for 60 km to Morehead Lake and South from the Bootjack Lake turn-off for another 12 km on the site access road to the property. The mine is positioned on a ridge dividing the Polley Lake / Hazeltine Creek and Bootjack Lake / Morehead Creek watersheds, both of which are tributaries of the Quesnel River.

A Reclamation and Closure Plan for the Mount Polley Project was approved by the Ministry of Energy and Mines (previously the Ministry of Employment and Investment) resulting in the issuance of Permit M-200 in July of 1997, last amended May 2001, which approves the Work System and Reclamation Program for Mount Polley (MPMC). The mine received a Ministry of Water, Land and Air Protection effluent permit PE 11678 (previously the Ministry of Environment, Lands and Parks) issued under the provisions of the "Waste Management Act" in May of 1997 and last amended in February 2002. This permit authorizes the discharge of concentrator tailings, mill site runoff, mine rock runoff, open pit water, and septic tank effluent from the ore concentrator.

This open pit mine is on a phased development schedule, ultimately involving the creation of three pits. Project infrastructure consists of the mill site, three open pits, three rock disposal sites (RDS) and a tailings storage facility (TSF), as well as the main access road, power line, tailings pipeline and sediment control ponds. Construction activities in 1995 consisted primarily of clearing the mill site. Construction of the whole facility began in 1996, and the mill was commissioned in June 1997. The first full year of mining and milling took place at Mount Polley in 1998. The last full year of mining and milling took place in 2000, with the mine suspending operations in October 2001.

All data collected throughout each year under permit PE 11678 is submitted in an

Annual Environmental Report by April 30th of the year following the reporting period. This includes a report on the construction and performance of the tailings impoundment and dam; reclamation activities; and an evaluation of the impacts of the operation on the receiving environment. For the M-200 permit, an Annual Reclamation Report outlining the results of all geological characterization, material characterization test work, and water quality monitoring is submitted by March 31st of each year. Also provided in this report are details of the reclamation plan and a summary of the disturbance and reclamation activities for the previous years and for five subsequent years. For the reporting year 2000, these two reports were first combined into one for submission to the Ministry of Energy and Mines and to the Ministry of Water, Land and Air Protection, in order to satisfy the requirements of the respective permits. For the reporting year 2003, this reporting format of a combined report for both Ministries has been continued.

1.1 RECLAMATION OBJECTIVES

In accordance with the BC Mines Act and the Health, Safety and Reclamation Code for Mines in British Columbia, the primary objective of the Reclamation Plan is to *"return all mine-disturbed areas to an equivalent level of capability to that which existed prior to mining on an average property basis, unless the owner, agent or manager can provide evidence which demonstrates to the satisfaction of the chief inspector the impracticality of doing so*".

To support mine planning, operations and reclamation, a comprehensive environmental baseline-monitoring program was designed and carried out in 1995 and 1996 to expand upon previous studies conducted in 1989/1990 (HKP 1996b, c, 1997; Blashill, 1996, 1997; ITM 1997). The environmental baseline studies document pre-development land use and conditions of the aquatic and terrestrial ecosystem. This provides the foundation upon which the operational and post–closure monitoring programs are based and reclamation activities are developed, such that the land may be returned to its original capability once mining has ceased. Environmental monitoring is on-going, fulfilling both the

requirements of the M – 200 permit by the Ministry of Energy and Mines (MEM) and the effluent permit PE 11678 by the Ministry of Water, Land and Air Protection (MWLAP).

For the Mount Polley project area, the primary end land uses of the reclamation plan are wildlife habitat and commercial forestry. Reclaimed areas will be capable of supporting secondary uses of the wildlife resource, such as hunting, guide-outfitting, trapping and outdoor recreation. Perpetuating, and, if possible, enhancing biodiversity is an important wildlife consideration. The following goals are implicit in achieving this primary objective:

- Long-term preservation of receiving water quality within and downstream of the receiving environment of the decommissioned operations;
- Long-term stability of engineered structures, including the rock disposal sites, tailings storage facility and open pits, as well as all exposed erodible materials;
- Natural integration of disturbed lands into surrounding landscape and, to the greatest possible extent, restoration of the natural appearance of the area after mining ceases;
- Establishment of a self-sustaining vegetative cover, consistent with the end land uses of wildlife habitat, commercial forestry, and outdoor recreation; and
- Removal and proper decommissioning of all secondary access roads, structures and equipment that are not required after the mine closes

To achieve these goals, reclamation planning must be flexible enough to allow for modifications to the mine plan, and to incorporate results from ongoing reclamation research programs into the plan. For instance, in 1998, a reclamation research test plot was established on the East 1170 RDS to monitor the effects of soil thickness and various other parameters on plant growth. Cells comprising new treatments were added to the test plot in 1999, and some of the

cells that were planted in 1998 were repeated in the 1999 plots with the original prescriptions. In 2000, Phase II of the Reclamation Research program was initiated, with additional plots established on re-sloped areas of the 1170 RDS.

1.2 ENVIRONMENTAL MONITORING

The main objective of the environmental monitoring program is to evaluate all data collected, so that site-specific objectives can be developed, which would focus on protecting the environment. Sampling procedures follow those that are described in the "British Columbia Field Sampling Manual for Continuous Monitoring plus the Collection of Air, Air Emission, Water, Wastewater, Soil, Sediment, and Biological Samples" and the Mount Polley "Quality Assurance/Quality Control Manual – 2001".

Water sampling and analysis is conducted throughout the year at surface and groundwater locations specified in Table 1 and at times specified in Table 2 of Permit PE 11678. The locations of all surface and groundwater monitoring sites are shown in Figure 2. Flow measurements are recorded at surface water stations specified in Section 3.3 of permit PE 11678. Static water levels are also recorded in groundwater monitoring wells at the time of sampling.

The Handar 555 weather station measures continuous wind speed and direction, daily precipitation, daily evaporation and temperature. This data is downloaded on a regular schedule and saved at the minesite for summarization at year end.

Under Section 3.2 of the permit, a biological monitoring program is conducted once every three years, starting in 1999. The first of these reports was submitted with the 1999 Annual Environmental Report. The second of these reports was conducted in 2002 and was submitted with the Annual Environmental and Reclamation Report 2002.

2.0 ENVIRONMENTAL PROTECTION & RECLAMATION PROGRAM

2.1 RECLAMATION FACILITIES AND STAFF

During operations, the Mount Polley reclamation research program and annual reclamation initiatives are under the direction of the Environmental Coordinator, who reports to the Mine Superintendent and Mine Manager. The assistant environmental coordinator, the survey crew, and a special projects coordinator also contribute to any reclamation activities undertaken at Mount Polley. Some programs also draw on the advice of reclamation specialists, including government and industry staff, Professional Agrologists and Registered Professional Foresters, for work such as soils inventory, classification and mapping.

In-house reclamation activities conducted by Mount Polley include:

- Drafting and surveying;
- Site preparation, land contouring;
- Installation of diversion ditches, drainage works and settling ponds;
- Placement of stockpiled materials on reclamation sites;
- Seeding of domestic grass-legume cover crops; and
- Monitoring/Reporting.

Mount Polley also has much of the heavy equipment necessary to carry out the reclamation activities, such as bulldozers, backhoes and haulage trucks, and will rent additional equipment, such as hydroseeders, harrows, plows and diskers, as they are needed.

Since operations have ceased in October 2001, the personnel at the site have been reduced to a skeleton crew. As a result, experienced individuals are hired as need to help in any reclamation initiatives. This organization of personnel will likely continue until operations resume at the Mount Polley minesite.

2.2 RECLAMATION ACTIVITIES – 2003

2.2.1 STABILITY OF WORKS

2.2.1.1 ROCK DISPOSAL SITES

Examinations are made in accordance with section 6.12.1 of the "Health, Safety and Reclamation Code for Mines in British Columbia". A variance was granted by MEM on February 9, 2001. Mount Polley operates in accordance with the terms and reference of this variance. The rock disposal sites (RDS) that are monitored are the East RDS, the North RDS and the Cariboo Pit RDS.

2.2.1.2 TSF AND ASSOCIATED WORKS

The last inspection of the TSF and associated works took place in late June 2002 by Knight Piésold Ltd. Data collected through the end of 2002 was included in the report. The findings are documented in the report entitled*, "Report on 2002 Annual Inspection" (Ref. No. VA101-1/3-1*). This report was submitted to the Ministry of Energy and Mines and the Ministry of Water, Land, and Air Protection in June 2003.

2.2.2 RE-VEGETATION TREATMENTS & FERTILIZER APPLICATIONS

Some exploration work, in the form of trenching, was conducted in the summer and fall of 2003 in the area referred to as the Northeast Zone (NE Zone). When the sampling of the trenches was complete, they were re-contoured and seeded with a vegetative mixture that has been typically used at the Mount Polley site since 1997. No fertilizer was placed on these trenches.

The total area that has been seeded/planted throughout the minesite is 94.00 Ha, while the area fertilized is 79.31 Ha. This data is summarized in Table 3.1.1-1.

2.2.3 ROCK DISPOSAL SITE RECLAMATION

No reclamation was conducted on the East, North and Cariboo Pit Rock

Disposal Sites at Mount Polley during 2003. However, results of the reclamation work from previous years dating back to 1998 can be seen in Photo Plates 1 thru 3.

2.2.4 WATERCOURSE RECLAMATION

No further changes to the watercourses at the Mount Polley minesite were made during 2003. All diversion ditches and pipelines continue to operate as designed.

2.2.5 PIT RECLAMATION

No reclamation was conducted on the Cariboo, Bell and Springer Pits at Mount Polley during 2003. Since Mount Polley is in Care and Maintenance mode, it is expected that mining will resume once it is more economically feasible to do so. As a result, the existing pits will remain un-reclaimed, so that mining can easily commence once these conditions are met.

2.2.6 TAILINGS STORAGE FACILITY (TSF) RECLAMATION

No reclamation was conducted at the TSF in 2003. However, the results of the reclamation work from previous years can be seen in Photo Plate 4.

2.2.7 ROAD RECLAMATION

No reclamation of roads was conducted during 2003.

2.2.8 SECURING OF MINE OPENINGS

As the Mount Polley Mine consists exclusively of open pits, there are no mine openings to secure.

2.2.9 METAL UPTAKE IN VEGETATION

No work on metal uptake in vegetation at the Mount Polley minesite was carried out during 2003. Once operations resume at Mount Polley, a cursory review of the conditions of metal uptake will likely occur to determine what, if any, metal uptake has occurred on an average property basis.

2.2.10 CHEMICAL, REAGENT OR SPILL WASTE DISPOSAL

No chemicals, reagents or spill waste was generated at Mount Polley during 2003. As a result, nothing was removed or disposed of during this period.

2.2.11 ACID ROCK DRAINAGE/ METAL LEACHING PROGRAM

Since mining ended in 2001, so did the operational waste characterization program at the Mount Polley mine. A final report detailing material characterization work from 2001 & 2002 was completed and submitted to the MEM in May 2004. When mining resumes at Mount Polley, so will the material characterization program.

2.3 SURFACE WATER MONITORING

Surface water sampling and analysis was conducted in accordance with sub-section 3.1 of the Mount Polley Effluent Permit PE 11678. Grab samples were taken from sampling locations and at a frequency listed in Table 1 of the permit and analyzed for the parameters listed in Table 2.

The calibration, sampling, filtering, preservation and shipping procedures used for the monitoring program are outlined in the "Quality Assurance/ Quality Control Manual 2001". The sampling program included monthly sampling at six sites (E4, E7, W4, W7, W8 & W8z), quarterly sampling at eight sites (E1, E8, W1, W3a, W5, W12 & W13), bi-annual sampling at one site (W11) and five weekly intensive sampling periods during spring freshet and fall turnover at four monitoring sites (W4, W7, W8 & W8z). Samples were submitted to Philip Analytical Services for analysis of physical parameters (turbidity, alkalinity, total suspended solids, dissolved sulphate, hardness, and D.O.C), nutrients (nitrate plus nitrite, ammonia & ortho-phosphorus) and total metals. Dissolved aluminum, copper and iron were also analyzed.

There were two additional sites monitored monthly, periodically or if there was a flow. The site names are MP1 (East RDS seep) and E9 (Bell Pit Water). The

water that makes up MP1 is typically diverted by the waste dump diversion ditch (WDDD) and pumped back to the Cariboo Pit, mostly during spring runoff. Further, the water in the Bell Pit has been slowly filling. It was sampled several times during 2003.

2.3.1 SITE E1 – TAILINGS SUPERNATANT

Table 2.3.1 (3 pages) summarizes the results of the water quality data from 1997 to 2003 for site E1 (Tailings Supernatant). Since the water quality of this site has changed dramatically since the cessation of activities at the mine, the data has been summarized into two different groups. The Operational data set runs from 1997 thru 2001, while the Post-Operational data set runs from 2002 thru 2003. Some of the parameters from these data sets have been graphically represented and can be found in figures 2.3.1-1 thru 2.3.1-2. Finally, the analytical reports for the 96 hour LC_{50} toxicity (rainbow trout) tests can be found in APPENDIX II of this report. A few key parameters are discussed in the following paragraphs.

Dissolved Sulphate values reached a high of nearly 180 mg/L at the end of 2001, when operations stopped. Since then, values have dropped to a median of 115.0 mg/L, with a minimum of 52.0 mg/L as recent as May 2003. Levels of Nitrate & Nitrite in the tailings supernatant had increased up to the end of 2001, but have since fallen back off to levels below 0.1 mg/l. Total suspend solids have been traditionally high at this site, due to the continuous depositions of the tailings. However, as expected, with the cessation of tailings deposition, the values for TSS have dropped nearly to method detection limits of 4 mg/L.

The levels of both Total Copper (T-Cu) and Dissolved Copper (D-Cu) have been steadily decreasing in the tailings supernatant since mining activities stopped at the end of 2001. T-Cu has decreased to an average of less than 0.025 mg/l during the period of 2002-2003. Further, D-Cu has decreased to below 0.013 mg/l during this same period. Other metals,

such as T-Se and T-Fe, have also decreased during the post-operational monitoring period.

2.3.2 SITE E4 – MAIN EMBANKMENT SEEPAGE POND

Table 2.3.2 (3 pages) summarizes the results of the water quality data from 2001 to 2003 for site E4. Further, figures 2.3.2-1 thru 2.3.2-2 contain the graphical representation of selected parameters from 2001 to 2003. Finally, the analytical reports for the 96 hour LC_{50} toxicity (rainbow trout) tests can be found in APPENDIX II of this report. As there has only been 2.5 years of data collected for this site, few conclusions can be drawn using this statistical data. However, as this is one of the two locations where there is a discharge from the minesite, a more detailed discussion of the parameters monitored for discharge limits is included in this section.

The discharge limit for non-filterable residue (TSS) is 25 mg/l. All samples taken in 2003 were below this discharge limit. In fact, most samples were less than the MDL of 4 mg/L.

The discharge limit for water volume at this site is 2000 m^3/day. The water volume discharge at E4 has never exceeded this limit. In fact, the peak discharge during spring freshet remained below 500 m^3/day and was typically around 200 m^3/day for the remainder of the year.

Three samples were taken from this location during 2003 and tested for toxicity. All data for this site showed 100% survival of rainbow trout, which is the prescribed discharge limit.

Nitrate (as Nitrogen) has a discharge limit of 10 mg/l for this site. All samples taken in 2003 were below this discharge limit. In fact, nearly all samples were less than 3 mg/L, with a trend downward to a minimum in late summer 2003.

Ortho-phosphorus (as Phosphorus) has a discharge limit of 0.05 mg/l for this site. All samples taken in 2003 were below this discharge limit. In fact, many samples were less than the MDL of 0.005 mg/L.

Dissolved sulphate has a discharge limit of 100 mg/l for this site. All samples taken in 2003 were below this discharge limit. Most samples fell between the range of 40 mg/L & 60 mg/L.

Total Copper (T-Cu) has a discharge limit of 0.020 mg/l for this site. All samples taken in 2003 were below this discharge limit. Most samples fell between the range of 0.003 mg/L & 0.006 mg/L.

Total Iron (T-Fe) has a discharge limit of 1.0 mg/l for this site. All samples taken in 2003 were below this discharge limit. In fact, all samples were below 0.3 mg/L.

Total Selenium (T-Se) has a discharge limit of 0.01 mg/l for this site. All samples taken in 2003 were below this discharge limit. In fact, all samples were below 0.0015 mg/L.

2.3.3 SITE E5 – MAIN EMBANKMENT DRAIN COMPOSITE

This site is scheduled to be sampled on a quarterly schedule. However, as the drain elevations that must be sampled are below the elevation of the discharge pipe from the seepage pond, the drains have not been available for sampling since the sustained discharge began at the Main Embankment Seepage Pond in October 2002. As a result, there were no samples taken during 2003. When operations resume at the mine, the discharge at the seepage pond will likely cease and sampling at station E5 can resume.

2.3.4 SITE E7 – PERIMETER EMBANKMENT SEEPAGE POND

Table 2.3.4 (3 pages) summarizes the results of the water quality data from 2001 to 2003 for site E7. Further, figures 2.3.4-1 thru 2.3.4-2 contain the graphical representation of selected parameters from 2001 to 2003. Finally, the analytical reports for the 96 hour LC_{50} toxicity (rainbow trout) tests can be found in APPENDIX II of this report. As there has only been 2.5 years of data collected for this site, few conclusions can be drawn using this statistical data. However, as this is one of the two locations

where there is a discharge from the minesite, a more detailed discussion of the parameters monitored for discharge limits is included in this section.

The discharge limit for non-filterable residue (TSS) is 25 mg/l. All samples taken in 2003 were below this discharge limit. In fact, most samples were less than the MDL of 4 mg/L, with a maximum of 20 mg/L in August.

Three samples were taken from this location during 2003 and tested for toxicity. All data for this site showed 100% survival of rainbow trout, which is the prescribed discharge limit.

Nitrate (as Nitrogen) has a discharge limit of 10 mg/l for this site. All samples taken in 2003 were below this discharge limit. In fact, nearly all samples were at the MDL of 0.005 mg/L.

Ortho-phosphorus (as Phosphorus) has a discharge limit of 0.05 mg/l for this site. All samples taken in 2003 were below this discharge limit. In fact, all but one of the samples were less than the MDL of 0.005 mg/L.

Dissolved sulphate has a discharge limit of 100 mg/l for this site. Samples collected in January & February 2003 were double the discharge limit at nearly 200 mg/L. However, since there is only discharge from this site during spring freshet periods, no water was being discharged when the levels exceeded the 100 mg/L limit. By April 2003, dissolved sulphate values had fallen to about 10 mg/L. Finally, by July 2003, the value of dissolved sulphate rose again and leveled off at around 150 mg/L.

The source of the dissolved sulphate at this location is believed to come from the downstream cyclone sand trial that is immediately adjacent to the Perimeter Embankment Seepage Pond. As most of the water that feeds this pond during the summer, fall and winter months comes from this area, it raises the level of dissolved sulphate during these time periods. However, when spring freshet fills the pond, it brings water with much lower levels of dissolved sulphate from the surrounding areas that are directed to this pond, thereby decreasing the overall level in the pond.

Monitoring will continue at this site and for this parameter, to ensure that it is below the established discharge limit if and when discharges occur from this location.

Total Copper (T-Cu) has a discharge limit of 0.020 mg/l for this site. All samples taken in 2003 were below this discharge limit. In fact, all samples were below 0.005 mg/L.

Total Iron (T-Fe) has a discharge limit of 1.0 mg/l for this site. All samples taken in 2003 were below this discharge limit. In fact, nearly all samples were below 0.15 mg/L.

Total Selenium (T-Se) has a discharge limit of 0.01 mg/l for this site. All samples taken in 2003 were below this discharge limit. In fact, nearly all samples were below 0.0030 mg/L.

2.3.5 SITE E8 – CARIBOO PIT

Table 2.3.5 (3 pages) summarizes the results of the water quality data from 1998 to 2003 for site E8. Further, figures 2.3.5-1 thru 2.3.5-2 contain the graphical representation of selected parameters from 1998 to 2003. A few key parameters are discussed in the following paragraphs. It should be noted that this site has sources of water from many different locations. It primarily receives water from the surrounding watershed, which drains the pit area and Cariboo Pit RDS. Secondly, water has been pumped from the Tailings Pond during the fall period of 2001, as well as the spring periods of 2002 & 2004. Thirdly, water is pumped from the diversion ditch below the East RDS, which is primarily made up of water from the site labeled MP1 (East RDS Seep). Each of these water inputs will affect the water at site E8 and needs to be considered when viewing the data from this site.

During the monitoring period from 1998 thru 2003, dissolved sulphate values have ranged from 10 mg/L to nearly 135 mg/L. During 2003, a low of 30 mg/L was reached in April, with an increasing trend toward June.

Levels of Nitrate & Nitrite in the Cariboo Pit supernatant have fallen off significantly since mining finished at the end of 2001. Values in 2003 remained low, with all data points below 2 mg/L.

Since mining operations ceased in late 2001, values for T-Cu have remained below 0.05 mg/L, and this trend continued for 2003. Further, T-Se has fallen off to below 0.03 mg/L, with one sample below 0.005 mg/L.

2.3.6 SITE E9 – BELL PIT

Table 2.3.6 (3 pages) summarizes the results of the water quality data from 2001 to 2003 for site E9. Further, figures 2.3.6-1 thru 2.3.6-2 contain the graphical representation of selected parameters from 2001 to 2003. A few key parameters are discussed in the following paragraphs.

During the final days of mining in late 2001, dissolved sulphate levels where around 200 mg/L, but have been moving towards 300 mg/L, through 2002 & 2003. This is likely due to the fact that the Bell Pit was never completely mined out. The bottom bench ended in high grade ore and there remains a significant ore body in this pit. Dissolved sulphate levels will likely remain high and may continue to rise, for the foreseeable future.

Levels of Nitrate & Nitrite in the Bell Pit water peaked at nearly 65 mg/L in August 2001, as mining operations were winding down. Since that time, values have fallen steadily to below 15 mg/L during the post-operational time period and have been around 6 mg/L to 7 mg/L for 2003.

T-Cu has been very consistently around 0.02 mg/L for the post-operational period. However, T-Mo has been on a steady increase to a high of nearly 0.23 mg/l during 2002 & 2003. Finally, T-Se has remained relatively flat around 0.03 mg/l. As can be seen from all these examples, nearly all of the dissolved metals follow and track the total metals very closely, indicating that most of the metals are in the dissolved form.

2.3.7 SITE MP1 – EAST ROCK DISPOSAL SITE SEEPAGE

Table 2.3.7 (3 pages) summarizes the results of the water quality data from 1998 & 2000 to 2003 for site MP1. Further, figures 2.3.7-1 thru 2.3.7-2 contain the graphical representation of selected parameters from 1998 & 2000 to 2003. A few key parameters are discussed in the following paragraphs. The source of this sample is groundwater that has come to the surface under the base of the East RDS. As the East RDS advanced, this small water source was covered over by the rock of the East RDS and now interacts with this waste rock. As a result, it is a good indicator of the water quality coming from the RDS.

Dissolved sulphate values have been increasing steadily for the last several years and have reached a new high in 2003 at nearly 850 mg/L. The range in 2003 was about 350 mg/L to nearly 850 mg/L. The level of dissolved sulphate should be monitored at this site closely, as it could provide valuable information about the long-term drainage chemistry from the rock dumps at Mount Polley.

Levels of Nitrate & Nitrite in this seepage sample have also increased over time and seem to fluctuate seasonally. For 2003, the range of this parameter starts at about 12 mg/L and rises to a high of about 34 mg/L. These levels are expected to eventually drop off over time, as the Nitrate from the rock is flushed from the dumps.

T-Cu has decreased significantly since mining operations have ceased. In 2003, values of T-Cu have been below 0.02 mg/L. T-Fe has also decreased during this time period and has leveled out below 0.1 mg/L. In an opposite trend, T-Mo has increase some since the cessation of mining activities and has ranged from 0.04 mg/L & 0.06 mg/L. Additionally, T-Se has been on the rise, with 2003 ranges from 0.12 mg/l to 0.34 mg/l.

2.3.8 SITE W1 – MOREHEAD CREEK

Table 2.3.8 (3 pages) summarizes the results of the water quality data

from 1997 to 2003 for site W1. It also computes the mean baseline data, from the periods 1990, 1995 & 1996. Further, figures 2.3.8-1 thru 2.3.8-2 contain the graphical representation of selected parameters from 1997 to 2003. A few key parameters are discussed in the following paragraph.

Dissolved sulphate values have remained at or below the baseline of 3.1 mg/L, with a peak in 2003 of 10.7 mg/L in October 2003. This peak value is not a concern at this time, since there was a high of 17.4 mg/L in November 1998. Levels of Nitrate & Nitrite have also remained close to the baseline value of 0.024 mg/L, with several exceptions as high as 0.30 mg/L. In 2003, one data point peaked at 0.16 mg/L, while the others were at or below the MDL of 0.005 mg/L. Finally, T-Cu values have always been close to the baseline of 0.006 mg/L and for 2003, no samples were higher than 0.005 mg/L.

2.3.9 SITE W3a – MINE DRAINAGE CREEK AT MOUTH

When the baseline monitoring program was established for the year 1995, a sampling location for Mine Drainage Creek was put in just below the minesite and it had the site code of W3. This site was monitored during the baseline periods of 1995 & 1996. In addition, when the operational monitoring program started in 1997, this same location was sampled until April 2000. Starting in May 2000, the sampling location for Mine Drainage Creek was moved to a new location named Mine Drainage Creek at Mouth and it had the site code of W3a. The new location is at the end of the creek, just before it empties into Bootjack Lake. All data after May 2000 was sampled from this new location.

When the mine began operations in 1997, the water from the site that normally fed into this creek was intercepted and collected, so as to minimize the water from the operations entering this system. As a result, the original sampling location (W3) had a significant decrease in flow volume, so much so that samples could only be collected during spring runoff, and sometimes during fall turnover. So, in spring 2000, it was

decided to move the sampling location to the end of the creek (W3a). Flow volume at this location occurred year round, so more samples could be collected throughout the year from this creek system.

Table 2.3.9 (3 pages) summarizes the results of the water quality data from 1997 to April 2000 for W3 and from May 2000 to 2003 for site W3a. It also computes the mean baseline data, from the periods 1995 & 1996. Further, figures 2.3.9-1 thru 2.3.9-2 contain the graphical representation of selected parameters for these same time periods. A few key parameters are discussed in the following paragraphs.

When sampling of W3a commenced in May 2000 and until operations ceased at the end of 2001, values for dissolved sulphate ranged from 5 mg/L to 15 mg/L. However, during the post-operating period, levels of dissolved sulphate have increased to about 68 mg/L. Careful monitoring of this site and parameter will continue into the future, to see if this pattern continues. As water from the minesite does not discharge to this creek system, it is not expected that the increased levels of dissolved sulphate are coming from the minesite, but this belief should be confirmed with continued monitoring studies.

Nitrate + Nitrite values have dropped some in 2003 to below 0.20 mg/L, which is significantly lower than the previous high of 0.68 mg/L in October 2001. Additionally, ortho-phosphorus values have fallen to MDL levels of 0.005 mg/L in 2003.

T-Cu has remained flat during 2003, with values around 0.015 mg/L. This is below the mean baseline value of 0.0348 mg/L, but since the baseline values where collected further upstream in the creek system at site W3, it is not surprising that the T-Cu values further downstream in the creek system have a lower concentration. Further, since the water from the minesite continues to be diverted from reaching this creek system, none of the water with higher concentrations of copper that originated at the ore body is able to raise the copper concentrations in the creek at this site.

That is, by diverting and using the water from the ore body, copper concentrations in this creek system have decreased to below baseline values.

2.3.10 SITE W4 – NORTH DUMP CREEK

Table 2.3.10 (3 pages) summarizes the results of the water quality data from 1997 to 2003 for site W4. It also computes the mean baseline data, from the periods 1990, 1995 & 1996. Further, figures 2.3.10-1 thru 2.3.10-2 contain the graphical representation of selected parameters from 1997 to 2003. A few key parameters are discussed in the following paragraphs.

Dissolved sulphate values have been rising somewhat since the cessation of mining activities at the end of 2001. With the exception of one sample in November 1998, all samples during the operating period were around the mean baseline of 6.4 mg/L. However, during the post-operating period starting in 2002, most samples have increased to two or three times the mean baseline level. The highest ever value was recorded in October 2003 at 61.9 mg/L. The samples that followed this date were also elevated well above the baseline level, but below the peak in October.

All but two of the samples from this site have been below the Approved and Working Quality Criteria (AWQC) 30-Day Average value that has been set at 50 mg/L. Further, all samples are below the (AWQC) Maximum value of 100 mg/L. It should be noted that the start of the elevated levels of dissolved sulphate in this creek coincide with the development of the Bell Pit & North RDS, which occurred almost exclusively in 2001. While there is no discharge of water from the Bell Pit itself, there is runoff from the North RDS that drains into this creek system. The increase during the fall of 2003 will continue to be monitored as part of the regular monitoring program. Site W4 is presently sampled monthly, as well as for five consecutive weeks during spring runoff and during fall turnover, so there is excellent cover of monitoring from this location.

Nitrate + Nitrite values have mostly remained flat throughout the

monitoring period of this site. Levels have been at or below the mean baseline value of 0.123 mg/L, with only several exceptions. During the spring runoff periods in 2002 & 2003, several samples returned values as high as 0.88 mg/L in 2002 & 0.716 mg/L in 2003. As was the case with dissolved sulphate, the elevated levels of Nitrate + Nitrite may be due to runoff from the North RDS. As is typical for this parameter, it fluctuates with the seasons and seems to be highest during the spring runoff periods. As Nitrate is removed from the RDS over time, it is expected that the levels that are seen in this creek will continue to decrease until they return to the background levels discussed earlier.

T-Cu values have always remained below the mean baseline of 0.035 mg/L throughout the operational & post-operational monitoring period. For the post-operating period starting in 2002, T-Cu has fluctuated between 0.003 mg/L to 0.015 mg/L. T-Iron has typically been at or below the baseline level of 0.097 mg/L during the operational & post-operational monitoring period, with only a few exceptions. Specifically, in the spring freshet periods of 2001 & 2002, T-Fe was in the order of 0.50 mg/L, which is about half an order of magnitude higher than the majority of the other samples from this site. Spring freshet 2003 saw a peak of 0.126 mg/L, which is about the same as the mean baseline level, so it appears that T-Fe has come back down to levels closer to the baseline.

2.3.11 SITE W5 – BOOTJACK CREEK ABOVE HAZELTINE CREEK

Table 2.3.11 (3 pages) summarizes the results of the water quality data from 1997 to 2003 for site W5. It also computes the mean baseline data, from the periods 1990, 1995 & 1996. Further, figures 2.3.11-1 thru 2.3.11-2 contain the graphical representation of selected parameters from 1997 to 2003. A few key parameters are discussed in the following paragraphs.

Dissolved sulphate values have typically ranged between 2 mg/L & 12 mg/L, with only a few exceptions. October 1998 had a value of 35.5 mg/L and 2001 had two elevated levels, with 58.7 mg/L in September & 38.3

mg/L in December. For 2003, values have been closer to the mean baseline of 5.1 mg/L, with the end of 2003 finishing at nearly 16 mg/L. Overall, most samples appear to be remaining close to the mean baseline values of this monitoring site.

Nitrate + Nitrite values have nearly all remained below the mean baseline concentration of 0.186 mg/L. Only in December 2001 did the level of this parameter rise marginally above the mean baseline to 0.23 mg/L. Further, ortho-phosphorus remains at the mean baseline of 0.005 mg/L for 2003, which is the MDL of this parameter. Three samples in 2001 had values as high as 0.041 mg/L, but all other samples from this site have been at the mean baseline level, previously mentioned.

T-Cu values have remained very flat throughout the monitoring period of 1997 to 2003, with all but one sample falling between the range of 0.001 mg/L & 0.014 mg/L. Only one sample in 1999 had a value outside this range at 0.0258 mg/L.

2.3.12 SITE W7 – UPPER HAZELTINE CREEK

Table 2.3.12 (3 pages) summarizes the results of the water quality data from 1997 to 2003 for site W7. It also computes the mean baseline data, from the periods 1990, 1995 & 1996. Further, figures 2.3.12-1 thru 2.3.12-2 contain the graphical representation of selected parameters from 1997 to 2003. Because this site receives water from the discharge of the perimeter embankment seepage pond, it is the sample location for the receiving environment from this discharge site. As a result, a more detailed review of the data at this site can be seen in the graphs discussed above. A few key parameters are discussed in the following paragraphs.

Dissolved sulphate typically ranged between 2 mg/l & 12 mg/l throughout the monitoring period of 1997 to 2003. However, starting in the fall of 2003, concentrations have risen to a new high of 22.9 mg/L. The concentration ended the year back within the more typical range, with a value of 12 mg/L. At no time throughout the year did the concentration of

dissolved sulphate exceed the AWQC 30-Day Average and Maximum limits (50 mg/L & 100 mg/L, respectively).

Nitrate (N) has typically ranged between 0.005 mg/l and 0.23 mg/l, with a peak of 0.414 mg/l in December 1998. Most values are very close to the mean baseline of 0.041 mg/L.

Ortho-phosphorus typically remained at or below the mean baseline of 0.008 mg/l, with several peaks as high as 0.08 mg/l in 2001. For 2003, one sample in August had a concentration of 0.055 mg/L, but this has since fallen off back to mean baseline levels by the end of 2003.

Non-filterable residue (TSS) has always been around the method detection limit of 4 mg/l, with some peaks around 19 mg/l in 1998 and March 2002. For 2003, one sample had a concentration of 12 mg/L, while all others remained close to the MDL of 4 mg/L.

T-Cu has remained very close to the mean baseline of 0.0032 mg/l throughout the discharge period in 2003, with several samples as high as 0.0067 mg/L. All samples have remained below the AWQC Maximum value of 0.00752 mg/L.

T-Fe has ranged as high as 1 mg/l (2000), but typically fluctuates between 0.1 mg/L & 0.5 mg/l. For 2003, one sample was as high as 0.7 mg/L, but levels have returned back to mean baseline concentrations of 0.206 mg/L.

T-Se is usually at the method detection limit, but had gone as high as 0.001 mg/l in May 2002. No unusual values were seen in the samples for 2003.

It appears that only dissolved sulphate has increased some in this creek due to the discharge from the perimeter embankment seepage pond. However, the increase is only twice the typical levels that have been seen in this creek, at this sampling location, prior to any discharge from the seepage pond. Further, the concentrations that have been seen are far below the AWQC 30-Day Average value of 50 mg/L. Continued

monitoring of this site on a monthly timetable, as well as consecutive sampling of five weeks in the spring freshet and fall turnover periods will be able to identify further changes to this or other parameters, if any, due to the discharge from the perimeter embankment seepage pond.

2.3.13 SITE W8 – NORTHEAST EDNEY CREEK TRIBUTARY

Table 2.3.13 (3 pages) summarizes the results of the water quality data from 1997 to 2003 for site W8. It also computes the mean baseline data, from the periods 1995 & 1996. Further, figures 2.3.13-1 thru 2.3.13-2 contain the graphical representation of selected parameters from 1997 to 2003. Because this site receives water from the discharge of the main embankment seepage pond, it is the sample location for the receiving environment from this discharge site. As a result, a more detailed review of the data at this site can be seen in the graphs discussed above. A few key parameters are discussed in the following paragraphs.

The mean baseline for dissolved sulphate at this site is 3.2 mg/L. All samples prior to the discharge from the seepage pond in 2002 were at the mean baseline concentration. However, since discharge began in June 2002, concentrations of dissolved sulphate rose significantly, with the highest level seen in July 2002 at 44.2 mg/L. Since this time, dissolved sulphate has fallen off some, with a low of 13 mg/L in April 2003 and a year-end concentration of 37 mg/L.

As was the case with dissolved sulphate, concentrations of Nitrate (N) have increased significantly since discharge from the seepage pond began in 2002. Prior to the discharge, concentrations were typically below 0.25 mg/L. However, since the discharge began, levels increased to as high as 1.91 mg/L, as was the case in June 2002. For 2003, concentrations have decrease somewhat, with a low of 0.122 mg/L and a year-end concentration of 0.93 mg/L.

Ortho-phosphorus typically remained below 0.02 mg/l prior to the discharge in 2002, with several peaks as high as 0.04 mg/l. Since the

discharge in 2002, concentrations of ortho-phosphorus have remained below 0.02 mg/l.

Non-filterable residue (TSS) has always been around the method detection limit of 4 mg/l, and this trend continued when discharges began in June 2002.

T-Cu has remained constant around 0.004 mg/l before and after the discharge period in 2002. One sample in October 2003 had a concentration of 0.0081 mg/L, but this level has since returned closer to the mean baseline concentration of 0.0039 mg/L.

T-Fe has fluctuated below 0.5 mg/l prior to the discharge from the seepage pond, and this trend continued through 2002 & 2003.

T-Se is usually around 0.0005 mg/l and no changes were seen after the start of discharge from the seepage pond in 2002.

It appears that only dissolved sulphate & nitrate have increased some in this creek due to the discharge from the main embankment seepage pond. However, the increases that have been seen are far below the AWQC 30-Day Average values of 50 mg/L for dissolved sulphate & 40 mg/L for nitrate. Continued monitoring of this site on a monthly timetable, as well as consecutive sampling of five weeks in the spring freshet and fall turnover periods will be able to identify further changes to this or other parameters, if any, due to the discharge from the main embankment seepage pond.

2.3.14 SITE W8z – SOUTHWEST EDNEY CREEK TRIBUTARY

Table 2.3.14 (3 pages) summarizes the results of the water quality data from 1997 to 2003 for site W8z. Further, figures 2.3.14-1 thru 2.3.14-2 contain the graphical representation of selected parameters from 1997 to 2003. A few key parameters are discussed in the following paragraph. It should be noted that this is a control site, as it is not downstream of any mine component at Mount Polley.

Dissolved sulphate values have a range of 1 mg/L & 8 mg/L, and the samples from 2003 continued to keep within this range. Additionally, Nitrate + Nitrite values have nearly all been below 0.5 mg/L and this trend continued through the end of 2003. Finally, T-Cu values have typically been below 0.008 mg/L, with the exception of one value in October 2003 which peaked at 0.0154 mg/L.

2.3.15 SITE W11 – LOWER EDNEY CREEK U/S OF QUESNEL LAKE

Table 2.3.15 (3 pages) summarizes the results of the water quality data from 1997 to 2003 for site W11. It also computes the mean baseline data, from the period 1995. Further, figures 2.3.15-1 thru 2.3.15-2 contain the graphical representation of selected parameters from 1997 to 2003. A few key parameters are discussed in the following paragraph. One point to note is that this site is a far-field site, selected for comparisons to the sites downstream from the mine disturbance. As with the control site W8z, it is not likely to show any effects from the mine operations.

Dissolved sulphate values have typically been below 12 mg/l and this trend continued in 2003, with the year-end value only slightly above this limit, at 14.9 mg/L. Additionally, Nitrate + Nitrite values have typically remained around the mean baseline of 0.039 mg/L, with a peak of 14.4 mg/L in 1999. For 2003, this trend continued, with a high of only 0.06 mg/L. Finally, T-Cu values have risen as high as 0.00612 mg/L, as they did in 1997. However, throughout 2003, T-Cu concentrations never exceeded the mean baseline level of 0.003 mg/L.

2.3.16 SITE W12 – 6K CREEK AT ROAD

Table 2.3.16 (3 pages) summarizes the results of the water quality data from 1997 & 1999 to 2003 for site W12. It also computes the mean baseline data, from the periods 1990 & 1995. Further, figures 2.3.16-1 thru 2.3.16-2 contain the graphical representation of selected parameters from 1997 & 1999 to 2003. A few key parameters are discussed in the

following paragraph.

Dissolved sulphate values have nearly all been below 8 mg/L, with most samples keeping close to the mean baseline of 3.6 mg/L. Samples from 2003 continued with this trend, with the exception of the final sample, which had a value of 21.7 mg/L. Additionally, Nitrate + Nitrite values always remained below 0.22 mg/L, and all samples for 2003 continued to be well below this maximum. Finally, T-Cu values have typically been at or below the mean baseline of 0.011 mg/L, and for samples in 2003, levels were all below this mean baseline, reaching no higher than 0.006 mg/L.

2.3.17 SITE W13 – 9.5K CREEK ON BJFSR

Table 2.3.17 (3 pages) summarizes the results of the water quality data from 2000 to 2003 for site W13. Further, figures 2.3.17-1 thru 2.3.17-2 contain the graphical representation of selected parameters from 2000 to 2003. A few key parameters are discussed in the following paragraph. It should be noted that this site was added to the monitoring program to find any effects that may come from the mining of the Springer Pit. As this pit development has not yet occurred, no changes to the water quality at this site are expected. However, the data collected so far will be valuable baseline data, should the development of the Springer Pit go ahead.

Dissolved sulphate values have a range of 1 mg/L to 4 mg/L. Additionally, Nitrate + Nitrite values have nearly all been below 0.02 mg/L, with only one sample in April 2002 above this level, at 0.14 mg/L. Finally, T-Cu values have ranged between 0.015 mg/L & 0.045 mg/L throughout this monitoring period.

2.4 GROUNDWATER MONITORING

Groundwater sampling and analysis was conducted in accordance with sub-section 3.1 of Effluent Permit PE 11678. Grab samples were taken from sampling locations and at a frequency listed in Table 1 and analyzed for the parameters listed in Table 2 of the permit.

The sampling, filtering, preservation and shipping procedures used for the monitoring program are outlined in the "Quality Assurance/ Quality Control Manual 2001". Field pH, temperature and conductivity were measured at the time of sampling using the WTW Multimeter.

In 1995, groundwater-monitoring well 1995 series were installed in the vicinity of the open pits and mill site. Two of these wells (95R-4, 95R-5) continue to be monitored. In 1996, the B.C. Ministry of Water, Land and Air Protection requested the establishment of additional monitoring wells down-gradient from the pit, Rock Disposal Site and Tailings Storage Facility, in order to sample aquifers in both surficial deposits as well as bedrock. They included the establishment of background wells up-gradient of any potential impacts by mining activities. Nine groundwater monitoring locations were established in 1996: six of these sites are multi-level, consisting of "A" (deep) wells and "B" (shallow) wells, while the remaining three sites monitor a single depth. A commitment to install three additional multi-level monitoring locations along the southeast embankment of the TSF was made in 1996. These wells were installed in 2000. The locations of the monitoring wells are shown in Figure 2.

Objectives of the groundwater-monitoring program include the following (Knight Piésold Ltd., 1996):

- To determine the direction and volume of groundwater flow from the minesite and other disturbed areas to receiving waters.
- To identify the locations of all surficial and deep groundwater aquifers underlying the mine site and their points of discharge to surface water.
- To establish background groundwater quality in aquifers prior to mine development; and
- To calculate seepage and groundwater contamination dilution ratios in surface receiving waters in order to minimize impacts.

Samples were submitted to Philip Analytical Services for water chemistry

analysis, including: physical parameters (alkalinity, sulphate and hardness), nutrients (nitrate plus nitrite, ammonia and ortho-phosphorus) and dissolved metals. The statistical results from 1997 to 2003 are graphed and discussed in the following sections.

2.4.1 95R-4 (Springer Pit Well)

95R-4 is located at Bootjack 10 km. Table 2.4.1 summarizes the results of the water quality data from 1997 to 2003 for this well. In addition, the mean baseline from samples in 1995 & January 1997 is included for comparison purposes. Further, figures 2.4.1-1 & 2.4.1-2 contain the graphical representation of selected parameters from 1997 to 2003. A few key parameters are discussed in the following paragraph.

Nitrate + Nitrite peaked at the end of 2002 at nearly 0.04 mg/L, but has since dropped back to baseline levels of 0.005 mg/L, which is the MDL of this parameter. Further, dissolved sulphate continues to be below the mean baseline value of 17.4 mg/L, with a range of 12 mg/L to 14 mg/L in 2003. Finally, dissolved metal concentrations remained relatively flat throughout the monitoring period of 1995 thru 2003.

2.4.2 95R-5 (Lower Southeast RDS Well)

95R-5 is located along Polley Lake FSR road, Northwest of the East Rock Disposal Site. Table 2.4.2 summarizes the results of the water quality data from 1997 to 2003 for this well. In addition, the baseline from one sample collected in 1995 is included for comparison purposes. Further, figures 2.4.2-1 thru 2.4.2-1 contain the graphical representation of selected parameters from 1997 to 2003. A few key parameters are discussed in the following paragraph.

Nitrate + Nitrite levels have only exceeded the baseline sample of 0.010 mg/L on two occasions. At the end of 1999, one sample had a value of 0.06 mg/L and another sample at the end of 2001 had a value of 0.035 mg/L. Further, dissolved sulphate has remained flat with averages around

20 mg/l, which is far below the baseline value of 36.4 mg/L. Finally, dissolved metal concentrations remained relatively flat throughout the monitoring period of 1995 thru 2003.

2.4.3 GW96-1A (TSF North Well – Deep)

GW96-1A is located down gradient of the seepage collection pond of the Perimeter Embankment. Table 2.4.3 summarizes the results of the water quality data from 1997 to 2003 for this well. Further, figures 2.4.3-1 thru 2.4.3-2 contain the graphical representation of selected parameters from 1997 to 2003. A few key parameters are discussed in the following paragraph.

Nitrate + Nitrite has fluctuated over the monitoring period as high as nearly 0.10 mg/L and as low as the MDL of 0.005 mg/L. For 2003, the level was around 0.04 mg/L. Further, dissolved sulphate values have remained very consistent throughout this time frame, fluctuating between 45 mg/L & 60 mg/L. This pattern continued through 2003. Dissolved copper, on the other hand, has risen some over the monitoring period, from lows reaching down to the MDL of around 0.0001 mg/L in 1998 to around 0.002 mg/L during 2002 & 2003. Finally, all other dissolved metal concentrations remained relatively flat throughout the monitoring period of 1997 thru 2003.

2.4.4 GW96-1B (TSF North Well – Shallow)

GW96-1B is located down gradient of the seepage collection pond of the Perimeter Embankment. Table 2.4.4-1 summarizes the results of the water quality data from 1997 to 2003 for this well. In addition, the baseline from one sample collected in 1996 is included for comparison purposes. Further, figures 2.4.4-1 thru 2.4.4-2 contain the graphical representation of selected parameters from 1997 to 2003. A few key parameters are discussed in the following paragraph.

Nitrate + Nitrite has remained at or below the baseline value of 0.041 mg/L

for the entire monitoring period, with the exception of one sample in 1998 & one in 1999. Further, dissolved sulphate concentrations have been on a steady decline, ranging from around 40 mg/L in 1997 to around 30 mg/L in 2003. Finally, dissolved metal concentrations remained relatively flat throughout the monitoring period of 1997 thru 2003.

2.4.5 GW96-2A (TSF East Well – Deep)

GW96-2A is located approximately 900 m Southeast from the GW96-1 monitoring wells and is designed to monitor any groundwater effects from the Tailings Storage Facility on Hazeltine Creek. Table 2.4.5 summarizes the results of the water quality data from 1997 to 2003 for this well. In addition, the baseline from one sample collected in 1996 is included for comparison purposes. Further, figures 2.4.5-1 thru 2.4.5-2 contain the graphical representation of selected parameters from 1997 to 2003. A few key parameters are discussed in the following paragraph.

Nitrate + Nitrite has remained flat throughout the monitoring period of 1997 to 2003, with a range of only 0.01 mg/L to 0.06 mg/L. During 2003, values never exceeded 0.02 mg/L. Further, dissolved sulphate values remained close to the baseline level of 23 mg/L, with 2003 values between 20 mg/L & 25 mg/L. Finally, all other dissolved metal concentrations remained relatively flat throughout the monitoring period of 1997 thru 2003.

2.4.6 GW96-2B (TSF East Well – Shallow)

GW96-2B is located approximately 900 m Southeast from the GW96-1 monitoring wells and is designed to monitor any groundwater effects from the Tailings Storage Facility on Hazeltine Creek. Table 2.4.6 summarizes the results of the water quality data from 1997 to 2003 for this well. In addition, the baseline from one sample collected in 1996 is included for comparison purposes. Further, figures 2.4.6-1 thru 2.4.6-2 contain the graphical representation of selected parameters from 1997 to 2003. A few key parameters are discussed in the following paragraph.

Nitrate + Nitrite levels have nearly always been at just above the MDL of 0.005 mg/L and this trend continued for 2003. Further, dissolved sulphate has remained very flat, with a range of only 2 mg/L to 8 mg/L. For 2003, the samples had values of around 5 mg/L to 6 mg/L. Finally, all other dissolved metal concentrations remained relatively flat throughout the monitoring period of 1997 thru 2003.

2.4.7 GW96-3A (TSF Southeast Well – Deep)

GW96-3A is located down gradient of the seepage collection pond of the Main Embankment. Table 2.4.7 summarizes the results of the water quality data from 1997 to 2003 for this well. Further, figures 2.4.7-1 thru 2.4.7-2 contain the graphical representation of selected parameters from 1997 to 2003. A few key parameters are discussed in the following paragraphs.

Average pH has fluctuated significantly, from 7.5 to 12.5 over the monitoring period of 1997 to 2003. This parameter has been graphed with dissolved aluminum, so as to show the relationship between the levels of dissolved aluminum and pH in any given sample. As can be seen, when the pH rises to levels of 12, the concentration of dissolved aluminum also increases to extremely levels, reaching to more than 2 mg/L, in one case. However, when the pH drops to more typical levels, such as 7.5 or 8, then the concentration of dissolved aluminum drops to below 0.05 mg/L.

Nitrate + Nitrite has usually remained below 0.1 mg/L, with only one sample in late 1999 peaking at nearly 0.26 mg/L. Further, dissolved sulphate has fluctuated significantly over the monitoring period of 1997 to 2003, ranging from 25 mg/L to 325 mg/L. There does not seem to be an apparent trend in this parameter at this time.

Dissolved copper seems to have risen some over this monitoring period, moving from 0.001 mg/L to around 0.0045 mg/L. However, all other dissolved metal concentrations remained relatively flat throughout the monitoring period of 1997 thru 2003.

It should be noted that this well has a very slow recharge rate, and in some cases, it is not possible to purge the well more than once in order to collect a sample in a timely manner. As a result, the results from this well should be viewed with caution and should be evaluated in connection with data from other wells in the vicinity of the TSF.

2.4.8 GW96-3B (TSF Southeast Well – Shallow)

GW96-3B is located down gradient of the seepage collection pond of the Main Embankment. Table 2.4.8 summarizes the results of the water quality data from 1997 to 2003 for this well. Further, figures 2.4.8-1 thru 2.4.8-2 contain the graphical representation of selected parameters from 1997 to 2003. A few key parameters are discussed in the following paragraph.

Nitrate + Nitrite has remained at or near the MDL of 0.005 mg/L for nearly all of the monitoring period, with the only exception in late 1999, where the sample had a value of around 0.075 mg/L. Further, dissolved sulphate has remained flat, averaging between 6 mg/l and 8 mg/l, with the most recent values in 200 at 6 mg/l. Finally, all dissolved metal concentrations remained relatively flat throughout the monitoring period of 1997 thru 2003.

2.4.9 GW96-4A (TSF Southwest Well – Deep)

GW96-4A is located down gradient of the south and main embankments. Table 2.4.9 summarizes the results of the water quality data from 1997 to 2003 for this well. In addition, the baseline from one sample collected in 1996 is included for comparison purposes. Further, figures 2.4.9-1 thru 2.4.9-2 contain the graphical representation of selected parameters from 1997 to 2003. A few key parameters are discussed in the following paragraphs.

Nitrate + Nitrite has remained very flat, at or below the MDL o 0.005 mg/L. Further, dissolved sulphate has continued the trend since 1999 of keeping

below about 5 mg/L.

Dissolved copper typically remained below 0.0024 mg/L, with only one exception. At the end of 2002, one sample had a value of 0.0054 mg/L, but this level returned back to the previous range below 0.0024 mg/L in 2003. All other dissolved metal concentrations, on the other hand, remained relatively flat throughout the monitoring period of 1997 thru 2003.

2.4.10 GW96-4B (TSF Southwest Well – Shallow)

GW96-4B is located down gradient of the south and main embankments. Table 2.4.10 summarizes the results of the water quality data from 1997 to 2003 for this well. In addition, the mean baseline from two samples collected in 1996 is included for comparison purposes. Further, figures 2.4.10-1 thru 2.4.10-2 contain the graphical representation of selected parameters from 1997 to 2003. A few key parameters are discussed in the following paragraphs.

Nitrate + Nitrite has remained below the mean baseline of 0.013 mg/L, with only one exception in 1999, which had a value of 0.031 mg/L. Further, dissolved sulphate has remained at or below the mean baseline of 2.5 mg/L for the entire monitoring period.

Dissolved copper typically remained close to the mean baseline of 0.0005 mg/L throughout the monitoring period. However, two samples, each at the end of 2002 & 2003 were slightly elevated, with 0.0022 mg/L in 2002 & 0.0014 mg/L in 2003. All other dissolved metal concentrations, on the other hand, remained relatively flat throughout the monitoring period of 1997 thru 2003.

2.4.11 GW96-5A (TSF Control Well – Deep)

GW96-5A is located at the north end and upstream of the Tailings Storage Facility and is monitored as a control site. Table 2.4.11 summarizes the results of the water quality data from 1997 to 2003 for this well. In

addition, the baseline from one sample collected in 1996 is included for comparison purposes. Further, figures 2.4.11-1 thru 2.4.11-2 contain the graphical representation of selected parameters from 1997 to 2003. A few key parameters are discussed in the following paragraphs.

Nitrate + Nitrite had a peak of 0.267 mg/L in 1998, but since that time and throughout 2003, nearly all samples have been below 0.1 mg/L. Further, dissolved sulphate has remained fairly close to the baseline of 15 mg/L, with only one exception in 2001, which had a value of 115 mg/L. This data point is expected to be an analytical or data entry error, as it is one order of magnitude larger than the more typical values from this well.

Dissolved copper typically remained close to the mean baseline of 0.004 mg/L throughout the monitoring period. However, one sample in 2002 had a value of 0.0071 mg/L. All other dissolved metal concentrations, on the other hand, remained relatively flat throughout the monitoring period of 1997 thru 2003.

2.4.12 GW96-5B (TSF Control Well – Shallow)

GW96-5B is located at the north end and upstream of the Tailings Storage Facility and is monitored as a control site. Table 2.4.12 summarizes the results of the water quality data from 1997 to 2001 for this well. Further, figures 2.4.12-1 thru 2.4.12-2 contain the graphical representation of selected parameters from 1997 to 2001. As this well had been damaged, no samples have been extracted from it since the end of 2001. When and if the well can be repaired, it can again be included in the sampling program.

2.4.13 GW96-6 (Southeast RDS Well)

GW96-6 is located down gradient of the East Rock Disposal Site. Table 2.4.13 summarizes the results of the water quality data from 1997 to 2003 for this well. Further, figures 2.4.13-1 thru 2.4.13-2 contain the graphical representation of selected parameters from 1997 to 2003. A few key

parameters are discussed in the following paragraph.

Nitrate + Nitrite has ranged from the MDL of 0.005 mg/L to 0.075 mg/L. Values for this parameter in 2003 were also within this range. Further, dissolved sulphate has remained constant, with averages around 25 mg/l. Only the first sample from this well was in excess of this average, with a value of 61 mg/L. Finally, all dissolved metal concentrations remained relatively flat throughout the monitoring period of 1997 thru 2003.

2.4.14 GW96-7 (Southeast Sediment Pond Well)

GW96-7 is located down gradient of the Mill Site, half way down the tailings access road, near the Booster Pump Station. Table 2.4.14 summarizes the results of the water quality data from 1997 to 2003 for this well. In addition, the baseline from one sample collected in January 1997 is included for comparison purposes. Further, figures 2.4.14-1 thru 2.4.14-2 contain the graphical representation of selected parameters from 1997 to 2003. A few key parameters are discussed in the following paragraph.

Nitrate + Nitrite has been moving between 0.005 mg/L and 0.014 mg/L throughout the monitoring period, and this continued for 2003. Further, dissolved sulphate has remained constant with averages around 25 mg/l. Finally, all dissolved metal concentrations remained relatively flat throughout the monitoring period of 1997 thru 2003.

2.4.15 GW96-8A (Bootjack FSR @ 11 K Well – Deep)

GW96-8A is located on Bootjack Road at 10.75 km. Table 2.4.15 summarizes the results of the water quality data from 1997 to 2003 for this well. Further, figures 2.4.15-1 thru 2.4.15-2 contain the graphical representation of selected parameters from 1997 to 2003. A few key parameters are discussed in the following paragraph.

Nitrate + Nitrite has usually been below 0.1 mg/L, with only two samples in 1998 & 1999 that exceeded this concentration, up to nearly 0.2 mg/L. Further, dissolved sulphate has remained constant with concentrations

ranging between 4 mg/l & 15 mg/l, with the most recent values in 2003 also within this range. Finally, all dissolved metal concentrations remained relatively flat throughout the monitoring period of 1997 thru 2003.

2.4.16 GW96-8B (Bootjack FSR @ 11 K Well – Shallow)

GW96-8B is located on Bootjack Road at 10.75 km. Table 2.4.16 summarizes the results of the water quality data from 1997 to 2003 for this well. Further, figures 2.4.16-1 thru 2.4.16-2 contain the graphical representation of selected parameters from 1997 to 2003. A few key parameters are discussed in the following paragraph.

Nitrate + Nitrite has fluctuated from 0.005 mg/L to 0.15 mg/L throughout the monitoring period, and this trend continued in 2003. Further, dissolved sulphate has narrowed its range somewhat, moving from lows of 2 mg/L & highs of 13 mg/L to a tighter range of 8 mg/L to 11 mg/L. Finally, all dissolved metal concentrations remained relatively flat throughout the monitoring period of 1997 thru 2003.

2.4.17 GW96-9 (TSF Southeast Pressure Well)

GW96-9 is located south of the Main Embankment. Table 2.4.17 summarizes the results of the water quality data from 1997 to 2003 for this well. Further, figures 2.4.17-1 thru 2.4.17-2 contain the graphical representation of selected parameters from 1997 to 2003. A few key parameters are discussed in the following paragraph.

Nitrate + Nitrite has fluctuated as high as 0.1 mg/L and the value for 2003 keeps within this range. Further, dissolved sulphate has remained below 5 mg/L, with the exception of one sample in 1999, which had a value of 57.1 mg/L. This value is one order of magnitude larger than all other samples from this well and is likely a data entry error from the lab. Finally, all dissolved metal concentrations remained relatively flat throughout the monitoring period of 1997 thru 2003.

2.4.18 GW00-1A (TSF Northwest Well – Deep)

GW00-1A is located downstream of the starter South Embankment at the TSF. Table 2.4.18 summarizes the results of the water quality data from 2000 to 2003 for this well. Further, figures 2.4.18-1 thru 2.4.18-2 contain the graphical representation of selected parameters from 2000 to 2003. A few key parameters are discussed in the following paragraph.

Nitrate + Nitrite has always been at the MDL of 0.005 mg/L, and this level continued for 2003. Further, dissolved sulphate has decreased from averages of 330 mg/l in 2000 to about 240 mg/l in 2003. Finally, all dissolved metal concentrations remained relatively flat throughout the monitoring period of 2000 thru 2003.

2.4.19 GW00-1B (TSF Northwest Well – Shallow)

GW00-1B is located downstream of the starter South Embankment at the TSF. Table 2.4.19 summarizes the results of the water quality data from 2000 to 2003 for this well. Further, figures 2.4.19-1 thru 2.4.19-2 contain the graphical representation of selected parameters from 2000 to 2003. A few key parameters are discussed in the following paragraph.

Nitrate + Nitrite has always been at the MDL of 0.005 mg/L, and this level continued for 2003. Further, dissolved sulphate has remained constant at around 9 mg/L. Finally, all dissolved metal concentrations remained relatively flat throughout the monitoring period of 2000 thru 2003.

2.4.20 GW00-2A (TSF West Well – Deep)

GW00-2A is located downstream of the starter South Embankment at the TSF. Table 2.4.20 summarizes the results of the water quality data from 2000 to 2003 for this well. Further, figures 2.4.20-1 thru 2.4.20-2 contain the graphical representation of selected parameters from 2000 to 2003. A few key parameters are discussed in the following paragraph.

Nitrate + Nitrite has risen to a high of 0.021 mg/L in 2003, but has since dropped back to it's more typical concentration of the MDL at 0.005 mg/L.

Further, dissolved sulphate has decreased from averages as high as 100 mg/l in 2000 to about 10 mg/l in 2003. Finally, all dissolved metal concentrations remained relatively flat throughout the monitoring period of 2000 thru 2003.

2.4.21 GW00-2B (TSF West Well – Shallow)

GW00-2B is located downstream of the starter South Embankment at the TSF. Table 2.4.21-1 summarizes the results of the water quality data from 2000 to 2003 for this well. Further, figures 2.4.21-1 thru 2.4.21-2 contain the graphical representation of selected parameters from 2000 to 2003. A few key parameters are discussed in the following paragraph.

Nitrate + Nitrite has risen from the MDL of 0.005 mg/L in 2000 to a high of 0.012 mg/L in 2003. Further, dissolved sulphate has decreased from averages as high as 18 mg/l in 2000 to a range between 2 mg/L & 6 mg/L in 2003. Finally, all dissolved metal concentrations remained relatively flat throughout the monitoring period of 2000 thru 2003.

2.4.22 GW00-3A (TSF Southwest Well – Deep)

GW00-3A is located downstream of the starter South Embankment at the TSF. Table 2.4.22 summarizes the results of the water quality data from 2000 to 2003 for this well. Further, figures 2.4.22-1 thru 2.4.22-2 contain the graphical representation of selected parameters from 2000 to 2003. A few key parameters are discussed in the following paragraph.

Nitrate + Nitrite has always been at the MDL of 0.005 mg/L, and this level continued for 2003. Further, dissolved sulphate has decreased from averages as high as 100 mg/l in 2000 to below 10 mg/l in 2003. Finally, all dissolved metal concentrations remained relatively flat throughout the monitoring period of 2000 thru 2003.

2.4.23 GW00-3B (TSF Southwest Well – Shallow)

GW00-3B is located downstream of the starter South Embankment at the TSF. Table 2.4.23 summarizes the results of the water quality data from

2000 to 2003 for this well. Further, figures 2.4.23-1 thru 2.4.23-2 contain the graphical representation of selected parameters from 2000 to 2003. A few key parameters are discussed in the following paragraph.

Nitrate + Nitrite has risen from the MDL of 0.005 mg/L in 2000 to a high of 0.012 mg/L in 2003. Further, dissolved sulphate has decreased from as high as 12 mg/l in 2000 to 6 mg/l in 2003. Finally, all dissolved metal concentrations remained relatively flat throughout the monitoring period of 2000 thru 2003.

2.5 CLIMATOLOGY

As a requirement of Effluent Permit PE 11678, the collection of detailed meteorology data was again performed in 2003. The main objective of the meteorology data collection program is to provide site-specific precipitation and evaporation data for use in water balance prediction. The automated weather station records prevailing wind speed and wind direction, temperature (at 1 metre & 5 metre elevations), precipitation, evaporation and solar radiation.

Due to technical difficulties with the weather station, however, no data was recorded for parts of July, August and all of December 2003. Additionally, there were some specific difficulties with some of the probes during 2003. They were:

- The temperature probe that records temperature values at 1 metre elevation failed sometime in May 2003. As a result, no temperature data for this elevation is available after this date.
- The solar radiation probe was not functioning throughout the entire year as well. No solar radiation data is available for 2003.
- The calibration of the evaporation pan was not implemented correctly during the spring of 2003. As a result, there is no evaporation data for the recording period of 2003.

During the spring and summer of 2004, an attempt will be made to bring the

weather station back to full function. Careful attention will be given to calibrating the evaporation pan. Further, the temperature and solar radiation probes will be checked, and, if defective, replaced with new probes, so that data collection can resume at the earliest possible date in 2004.

2.5.1 WIND SPEED BY DIRECTION & PREVAILING WIND DIRECTION

Prevailing wind speeds and direction can be seen in figures 2.5.1-1 thru 2.5.1-6. Prevailing winds were again from the northwest in the winter months and the south & southwest during the summer months. Highest wind speeds were recorded in January at approximately 2.49 m/s.

2.5.2 TEMPERATURE – AVERAGE, MINIMUM AND MAXIMUM

Graphical comparisons of daily mean, maximum and minimum air temperature at the 1 metre elevation and 5 metre elevation sensors are presented in figures 2.5.2-1 thru 2.5.2-2. Temperatures ranged from a low of –31.7°C in March 2003 to a high of +29.1°C in June of 2003.

2.5.3 PRECIPITATION

The precipitation record at the weather station spanned from April to November 2003, with some data missing in July & August. Figure 2.5.3-1 illustrates the daily precipitation values for this period. There were three peak precipitation events recording greater than 12 mm of rain during this time period in 2003, and one more peak event that was nearly 12 mm of rain. The three peak events greater than 12 mm ranged from about 15 mm to 18 mm.

2.5.4 EVAPORATION

As was mentioned in the opening section to Climatology, there was no data collected for evaporation during 2003.

2.5.5 SOLAR RADIATION

As was mentioned in the opening section to Climatology, there was no

data collected for solar radiation during 2003.

2.5.6 WATERBALANCE

Table 2.5.6 (8 pages) contains the waterbalance spreadsheet for the period 1997 to 2004. A review of the waterbalance is included in the Annual Tailings Inspection report, referred to in section 2.2.1.2. Since the winter of 2002/2003 had a lower than normal snow pack, it was unnecessary to remove water from the TSF during the spring or fall periods of 2003, in order to maintain the permitted freeboard. It is expected that the winter of 2003/2004 will have a more typical snow pack and, as a result, it will be necessary to remove water from the TSF via a discharge permit or via the pumping system to the Cariboo Pit. Details of what occurs will be discussed in next years' Annual Environmental and Reclamation Report.

2.6 HYDROLOGY AND HYDROGEOLOGY

Seven surface water sites were monitored for flow discharges throughout 2003 in the vicinity of the Mount Polley minesite. Monthly discharge graphs were generated for each of the monitoring stations listed below: W1a, W3a, W4, W5, W7, W8 and W12. No flow transect studies were conducted in 2003. Instead, staff gauge readings were recorded and applied to a formula determined from the previous years measurements that gave a stage discharge curve for each monitoring site. Staff gauges were covered in snow and ice from January to April and in November and December. Continuous water level data is recorded at Station W7 on Hazeltine Creek from approximately March to November of each year.

In addition to these surface water sites, there were 22 groundwater wells that were monitored for static water levels throughout 2003, also in the vicinity of the Mount Polley minesite. Graphs have been generated and are discussed in sub-section 2.6.8.

2.6.2 SITE W1A – UPPPER MOREHEAD CREEK

Figure 2.6.1 shows the flow measurement comparisons from 1997 to 2003. Spring freshet flows where below the volumes seen in 1999 thru 2001, but above the low flow year of 1998. Flows after spring freshet were in line with those seen in most of the previous years at this monitoring location.

2.6.2 SITE W3A – MINE DRAINAGE CREEK AT MOUTH

From 1995 through 1999, water volumes were monitored on this creek at site W3, which is located just downstream from the minesite. Starting in 2001, water volumes were monitored from a new location on this creek, labeled W3A. This location is at the end of the creek, immediately before it empties into Bootjack Lake. Figure 2.6.2 shows the flow measurement comparisons for monitoring site W3, with data from 1995 & 1997 to 2001 as well as the flow measurement comparisons for monitoring site W3A, with data from 2001 & 2003.

Since the data from W3A can really only be compared to the data collected from previous years at the same location, water volumes from 2003 will be compared to the only other data from this site, which is from 2001. Flow volumes for spring freshet 2003 are nearly the same as those from 2001, but have been shifted some. Peaks in 2003 occurred in April, while the peak flows in 2001 occurred in May.

2.6.3 SITE W4 – NORTH DUMP CREEK

Figure 2.6.3 shows the flow measurement comparisons from 1995 & 1997 to 2003. As was the case for site W1A, water volumes during the spring freshet period for 2003 were lower than for those in 1999 thru 2001, but were higher than those seen in the low flow year of 1998. Water volumes for the remained of the year were similar to previous years.

2.6.4 SITE W5 – BOOTJACK CREEK ABOVE HAZELTINE CREEK

Figure 2.6.4 shows the flow measurement comparisons from 1995 & 1997

to 2003. Unfortunately, no measurements for 2003 were taken during the spring freshet period. As a result, no comparisons can be made to previous years during this period of time. However, water volumes or the remainder of the year were similar to, although a little lower than, those from previous years.

2.6.5 SITE W7 – UPPPER HAZELTINE CREEK HYDROGRAPH

Figure 2.6.5 shows the flow measurement comparisons from 1995 & 1997 to 2003. This is a continuous flow measurement station, when temperatures are above freezing. Flows in 2003 were similar to those seen in 1997, 1999 & 2002, but were higher than those in 1995, 1998, 2000 & 2001. In addition, the runoff peaked earlier than any other year, starting in early to mid-April, rather than mid to late-April.

2.6.6 SITE W8 – NORTHEAST EDNEY CREEK TRIBUTARY

Figure 2.6.6 shows the flow measurement comparisons from 1995 & 1997 to 2003. Spring freshet water volumes for 2003 seems similar to those seen in 1998 and were much lower than those from 1999, 2000 & 2002. However, for the remainder of the year after spring freshet, water volumes for 2003 were much more similar to those of previous years.

2.6.7 SITE W12 – 6K CREEK AT ROAD

Figure 2.6.7 shows the flow measurement comparisons from 1997 to 2003. Spring freshet flows were lower than in 1999 & 2000. However, flows for the remaining part of the year matched well with previous year flows.

2.6.8 GROUNDWATER STATIC WATER LEVELS

Figure 2.6.8-1 contains the static water levels (SWL) for the wells 95R-4 & 95R-5, for the period 1996 to 2003.

- For well 95R-4, the SWL has been consistently around 11 metres, with only one exception in June 2000, when it was at 0 metres. As

for well 95R-5, the SWL has been shifting between 2 metres & 0 metres, with no specific trend.

Figure 2.6.8-2 contains the static water levels for wells GW96-1A/1B, GW96-2A/2B, GW96-3A/3B & GW96-4A/4B for the period 1996 to 2003.

- For well GW96-1A, the SWL has been mostly between 15 metres & 20 metres, but has dropped as low as 40 metres in spring 2001 and as high as nearly 0 metres in summer 2001. As for well GW96-1B, the SWL has been very consistent at 13 metres, with a movement to nearly 0 metres in the summer of 2001. This peak matches perfectly with those seen in the twin well GW96-1A.
- For well GW96-2A, the SWL has been mostly at 30 metres, with only a few exceptions. In the summers of 2001 & 2003, the SWL moved to 5 metres, before returning to its more typical level of 30 metres. As for well GW96-2B, the SWL has been very consistent at 15 metres, with a movement to nearly 5 metres in the summers of 2001 & 2003. These peaks match perfectly with those seen in the twin well GW96-2A.
- For well GW96-3A, the SWL has fluctuated wildly, with a range of 42 metres to nearly 0 metres. The latest reading in 2003 is at 42 metres. As for well GW96-3B, the SWL has been very consistent at 0 metres, with a movement to nearly 5 metres in the summers of 2001 & 2003. These peaks match with similar peaks for wells GW96-1 & GW96-2.
- For well GW96-4A, the SWL has ranged from 0 metres down to nearly 4 metres. The most recent readings in 2003 are around 3 metres. As for well GW96-4B, the SWL has matched the SWL pattern of its twin well GW96-4A almost perfectly. The most recent values for 2003 are also around 3 metres.

Figure 2.6.8-3 contains the static water levels for wells GW96-5A/5B,

GW96-6, GW96-7, GW96-8A/8B & GW96-9 for the period 1996 to 2003.

- For well GW96-5A, the SWL has been mostly between 5 metres & 0 metres, but has dropped as low as 13 metres in winter 2001. As for well GW96-5B, the SWL has been very consistent between 3 metres & 0 metres. No data points exists after 2001, as this well was damaged around this time.
- For well GW96-6, the SWL has been nearly always been at 0 metres, but it has dropped as low as 15 metres, as it did in spring 2000.
- For well GW96-7, the SWL has been very constant between 5 metres & 2 metres. The most recent values in 2003 were around 3.5 metres.
- For wells GW96-8A & GW96-8B, the SWL for both wells has always been 0 metres, and this continued for 2003.
- For well GW96-9, the SWL has ranged from 0 metres down to nearly 2.5 metres. The most recent readings in 2003 are around 0.8 metres.

Figure 2.6.8-4 contains the static water levels for wells GW00-1A/1B, GW00-2A/2B & GW00-3A/3B for the period 2000 to 2003.

- For well GW00-1A, the SWL has fluctuated between 8.5 metres & 0.5 metres, with the most recent values in 2003 at 8 metres. As for well GW00-1B, the SWL has been much flatter, ranging from 2.5 metres to 0.5 meters.
- For well GW00-2A, the SWL has remained fairly flat, with a range of about 6 metres to 4 metres. As for well GW00-2B, the SWL has followed its twin well GW00-2A almost perfectly, where the trend is only 0.5 metres lower than the deep well.
- For well GW00-3A, the SWL has fluctuated somewhat, with the

majority of the samples between 6 metres & 4 metres, but with several samples in 2002 & 2003 as low as 19 metres. As for well GW00-3B, the SWL has been very consistent at within the range of 6 metres to 4 metres.

2.7 RECLAMATION RESEARCH – 2003

No further formal reclamation research was conducted in 2003. Further, the research test plots on the 1170 RDS will be maintained, but will not be monitored in detail until operations resume at Mount Polley or the need arises to do so.

3.0 MINING PROGRAM

A detailed Mine Plan was presented in the Reclamation and Closure Plan submitted to MEM and approved under Permit M-200.

3.1 SURFACE DEVELOPMENT TO DATE

3.1.1 AREAS OF DISTURBANCE TO END OF 2003

Since mining operations ceased in 2001, there was almost no new disturbance were created in 2003. The only exception is the exploration work in the Northeast Zone (NE Zone) that was conducted toward the end of 2003. The disturbed areas drawing (figure 3 – inside-front cover of report) has been updated from the 2002 drawing to include this new disturbance from the exploration program. Areas of disturbance were determined from analysis of an orthophoto taken in July 2001, just prior to the shut down of the mine, as well as a survey of the new disturbance mentioned above. Disturbed areas were identified and categorized by disturbance type, and then digitized into AutoCAD.

At the end of 2003, the total disturbed area in all categories was 497.56 Ha. Surface areas of the various disturbed reclamation units are outlined in Table 3.1.1-1 and are detailed by mine component in Table 3.1.1-2.

As no mining took place in 2003, there are no changes to the quantities of waste rock, tailings or low-grade ore from the year that mining ceased in 2001. However, the quantities to the end of mining in 2001 can be viewed in table 3.1.1-3.

3.2 SURFACE DEVELOPMENT IN 2003

As discussed in the previous section, since mining operations ceased in 2001, almost no new disturbance was created in 2003. The only exception was 6.69 Ha of exploration trenching that took place in the area known as the NE Zone.

3.3 PROJECTED SURFACE DEVELOPMENT FROM 2004 TO 2008

3.3.1 AREAS OF DISTURBANCE

There will be no further projection of disturbance at Mount Polley until mining operations resume. However, tables 3.3.1-1 & 3.3.1-2 have been completed to demonstrate the projection of no further disturbance for the next five years and mine life.

3.3.2 SALVAGING AND STOCKPILING OF SURFICIAL MATERIALS

Soil salvage is a critical component of reclamation planning, as it will provide the soil material necessary to reclaim the mine site for desired end land uses. In 1997, Mount Polley prepared a Soil Salvage and Stockpile Protocol, SSSP-97, which addressed site-specific criteria relating to soil management.

No soil stripping, salvage or stockpiling occurred at the Mount Polley mine site in 2003. Present soil stockpiles are indicated on Figure 3 and are summarized with respect to area stripped, soil volumes recovered, source description and target depths for salvage in Table 3.3.2-1.

3.3.3 DRAINAGE CONTROL / PROTECTION OF WATERCOURSES

Knight Piésold (Ref. No. 1624/1, 1995) has developed an overall water management plan for the project. This plan had been changed in 2001 for the care and maintenance period. Please refer to the Annual

Environmental and Reclamation Report 2001 for an update of the water management plan.

4.0 FUTURE RECLAMATION PROGRAMS

4.1 RECLAMATION RESEARCH FOR 2004

No formal reclamation research is planned for 2004.

5.0 RECLAMATION COST PROJECTIONS

Detailed cost projections for the end of 2003 have been completed. The summary tables and detailed categories of disturbance can be found in APPENDIX I - RECLAMATION BOND COSTING – 2003.